

Trauma and Injury Subcommittee Update



**Defense Health Board
18 August 2010**



Overview

- **Proposed Changes to the TCCC Guidelines**
- **Hypothermia Prevention**
- **Fluid Resuscitation in Tactical Evacuation Care**

Coalition forces at this point in time have the best combat casualty treatment and evacuation system in history. TCCC's job is to make sure that the casualties get to the hospital alive so that they can benefit from it. .



Hypothermia and Coagulopathy on the Battlefield

Hypothermia in a trauma victim is a much more complicated threat than simple hypothermia in an otherwise healthy person. **The primary concern in this setting is hemostasis, since coagulopathy may occur with even mild hypothermia.** Hypothermia-induced coagulopathy is well-described, and results from decreases in platelet function, slowing of coagulation cascade enzyme activity (135, 136) and alterations of the fibrinolytic system.(136) Furthermore, hypothermia is not limited to cold environments – it can occur in warm ambient temperatures. Hypovolemic shock results in a decreased ability to produce heat and to maintain normal body temperature. This predisposes shock victims to hypothermia, and can contribute to worsening of the hypovolemic state as a result of ensuing coagulopathy.

***PHTLS Manual
ACS/NAEMT
Seventh Edition
In press***



Hypothermia Prevention in Combat Casualties

- **Key Point: Even a small decrease in body temperature can interfere with blood clotting and increase the risk of bleeding to death.**
- Casualties in shock are unable to generate body heat effectively.
- Wet clothes and helicopter evacuations increase body heat loss.
- **Hypothermia is much easier to prevent than to treat!**



Cold Stress During TACEVAC





Proposed Change: Hypothermia Prevention

Reason for Change:

- **Combat medics have noted that the previously recommended Blizzard Survival Blanket did not allow easy access to the casualty.**
- **The previously recommended hypothermia prevention cap was often blown off the head during casualty loading onto a helicopter.**
- **A new hypothermia prevention blanket has been developed that both allows easier access to the casualty and incorporates a hood into the blanket, eliminating the need for a cap.**



Blizzard Survival Blanket

Wrap in Blizzard Survival Blanket





NEW HPMK





Proposed Change: Hypothermia Prevention

Tactical Field Care – Current:

7. Prevention of hypothermia

- a. Minimize casualty's exposure to the elements. Keep protective gear on or with the casualty if feasible.
- b. Replace wet clothing with dry if possible.
- c. Apply Ready-Heat Blanket to torso.
- d. Wrap in Blizzard Survival Blanket.



Proposed Change: Hypothermia Prevention

Tactical Field Care – Current:

7. Prevention of hypothermia (cont)

- e. Put Thermo-Lite Hypothermia Prevention System Cap on the casualty's head, under the helmet.
- f. Apply additional interventions as needed and available.
- g. If mentioned gear is not available, use dry blankets, poncho liners, sleeping bags, body bags, or anything that will retain heat and keep the casualty dry.



Proposed Change: Hypothermia Prevention

Tactical Evacuation Care – Current:

6. Prevention of hypothermia

- a. Minimize casualty's exposure to the elements.
Keep protective gear on or with the casualty if feasible.
- b. Continue Ready-Heat Blanket, Blizzard Survival Blanket, and Thermo - Lite Cap.
- c. Apply additional interventions as needed.
- d. Use the Thermal Angel or other portable fluid warmer on all IV sites, if possible.
- e. Protect the casualty from wind if doors must be kept open.



Proposed Change: Hypothermia Prevention

Tactical Field Care – Proposed Change:

7. Prevention of hypothermia

- a. Minimize casualty's exposure to the elements. Keep protective gear on or with the casualty if feasible.
- b. Replace wet clothing with dry if possible. **Get the casualty onto an insulated surface as soon as possible.**
- c. **Apply the Ready-Heat Blanket from the Hypothermia Prevention and Management Kit (HPMK) to the casualty's torso (not directly on the skin) and cover the casualty with the Heat-Reflective Shell (HRS).**



Proposed Change: Hypothermia Prevention

Tactical Field Care – Proposed Change:

7. Prevention of hypothermia (cont)

- d. If an HRS is not available, the previously recommended combination of the Blizzard Survival Blanket and the Ready Heat blanket may also be used.
- e. If the items mentioned above are not available, use dry blankets, poncho liners, sleeping bags, or anything that will retain heat and keep the casualty dry.
- f. Warm fluids are preferred if IV fluids are required.



Proposed Change: Hypothermia Prevention

TACEVAC Care – Proposed Change:

- a. Minimize casualty's exposure to the elements. Keep protective gear on or with the casualty if feasible.
- b. Replace wet clothing with dry if possible if not previously done. **Get the casualty onto an insulated surface as soon as possible.**
- c. **Apply the Ready-Heat Blanket from the Hypothermia Prevention and Management Kit (HPMK), to the casualty's torso (not directly on the skin) and cover the casualty with the Heat-Reflective Shell (HRS).**



Proposed Change: Hypothermia Prevention

TACEVAC Care – Proposed Change:

- d. If a HRS is not available, the previously recommended combination of the Blizzard Survival Blanket and the Ready Heat blanket may also be used.
- e. If the items mentioned above are not available, use poncho liners, sleeping bags, or anything that will retain heat and keep the casualty dry.
- f. Use a portable fluid warmer capable of warming all IV fluids including blood products.
- g. Protect the casualty from wind if doors must be kept open.



Prehospital Fluids - A Look Back: 1993



- **Prehospital fluid resuscitation at the time per ATLS was 2 liters of Lactated Ringer's solution**
- **Special Operations Biomedical R+D project: Trauma care guidelines customized for the battlefield**



Key Premise

- **If we are going to ask a medic or corpsman to perform a medical intervention on the battlefield, we want to be very confident that it will benefit the casualty.**





Fluid Resuscitation

“Despite its widespread use, the benefit of prehospital fluid resuscitation in trauma patients has not been established.” (17 references)

“The animal data from a variety of uncontrolled hemorrhage models has clearly established that aggressive fluid resuscitation in the setting of an unrepaired vascular injury is either of no benefit or results in an increase in blood loss and/or an increase in mortality when compared to no fluid resuscitation or hypotensive resuscitation.” (12 references)



Fluid Resuscitation

- The beneficial effect from crystalloid and colloid fluid resuscitation in hemorrhagic shock has been demonstrated largely on animal models where the volume of hemorrhage is controlled experimentally and resuscitation is initiated after the hemorrhage has been stopped.
- Controlled hemorrhage





Fluid Resuscitation: Uncontrolled Hemorrhage

- World War I combat trauma patients
- Concluded that initiating IV fluid replacement without first obtaining surgical hemostasis promoted further hemorrhage.

Cannon
JAMA 1918





Fluid Resuscitation: Uncontrolled Hemorrhage

- 6855 trauma patients
- Found that although hypotension was associated with a significantly higher mortality rate in trauma patients, the administration of prehospital IV fluids did not influence this rate.
- Did not address subgroups with controlled versus uncontrolled hemorrhage.

Kaweski et al
J Trauma 1990



Fluid Resuscitation: Uncontrolled Hemorrhage

- **Retrospective analysis of patients with ruptured abdominal aortic aneurysms and hypotension**
- **Survival rate of 30% in patients treated with aggressive preoperative colloid fluid replacement.**

*Crawford
J Vasc Surgery 1991*



Fluid Resuscitation: Uncontrolled Hemorrhage

- **Survival rate of 46% in hypotensive patients with ruptured abdominal aortic aneurysms given only enough fluid to maintain a systolic blood pressure of 50 to 70 mm Hg until the time of operative repair.**
- **Recommendation: Withhold aggressive fluid resuscitation until the time of surgery in patients with ruptured abdominal aortic aneurysm**

*Crawford
J Vasc Surgery 1991*



Fluid Resuscitation: Uncontrolled Hemorrhage



The NEW ENGLAND
JOURNAL of MEDICINE

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ORIGINAL ARTICLE

Volume 331:1105-1109 October 27, 1994 Number 17 Next ►

Immediate versus Delayed Fluid Resuscitation for Hypotensive Patients with Penetrating Torso Injuries

*William H. Bickell, Matthew J. Wall, Paul E. Pepe, R. Russell Martin, Victoria F. Ginger,
Mary K. Allen, and Kenneth L. Mattox*

- Large prospective trial
- 598 patients with penetrating torso trauma and hypotension
- Aggressive fluid resuscitation begun prehospital resulted in a survival rate of 62%.



Fluid Resuscitation: Uncontrolled Hemorrhage

- **Aggressive fluid replacement withheld until the time of operative intervention resulted in significantly higher survival rate of 70%**
- **Mean transport times to the trauma center:**
 - 12 minutes for immediate resuscitation group
 - 13 minutes for the delayed resuscitation group.
- **Transport times from the battlefield to a MTF during an armed conflict are expected to be much longer**
- **A definitive answer to the wrong question?**



Fluid Resuscitation: Uncontrolled Hemorrhage

- **Animal studies of uncontrolled hemorrhage**
- **Observation periods of 60 to 240 minutes**
- **Beneficial effect from withholding fluid replacement or still present (9 references)**





Crystalloids vs Colloids in Controlled Hemorrhage

- **From a battlefield trauma care perspective....**
- **Sodium in crystalloids equilibrates rapidly throughout the entire extracellular space**
- **Water follows**
- **What does this mean for your buddy in shock?**



Crystalloids vs Colloids in Controlled Hemorrhage

- Give 1000cc LR
- Wait one hour
- Only 200cc of infused volume of LR is still in the intravascular space



Rainey et al
The Pharmacologic Approach to
The Critically Ill Patient. 1988



Crystalloids vs Colloids in Controlled Hemorrhage

- In civilian settings, additional volume replacement therapy with blood components can be carried out shortly after the initial crystalloid therapy if necessary.
- Typical transport intervals for civilian urban ambulance systems are 15 minutes or less.
- With these very short transport intervals, most of the infused crystalloid is still in the intravascular space by the time of arrival at the trauma center.
- In military settings, evacuation times are longer: 2 - 4 hours in Desert Storm; 15 hours in Mogadishu



Crystalloids vs Colloids in Controlled Hemorrhage

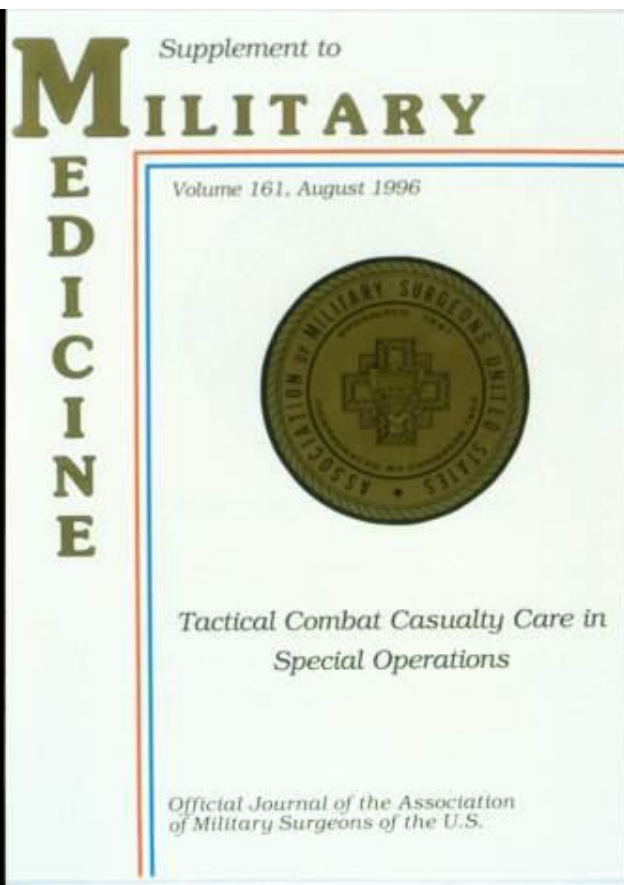
- **6% hetastarch – large molecules and fluid retained in intravascular space**
- **500 cc of 6% hetastarch results in an initial intravascular volume expansion of almost 800 ccs**
- **Volume expansion sustained for at least 8 hours.**

Mortelmans

Eur J Anesthesiol 1995



Tactical Combat Casualty Care in Special Operations



Military Medicine Supplement August 1996

*Trauma care guidelines
customized for the battlefield*

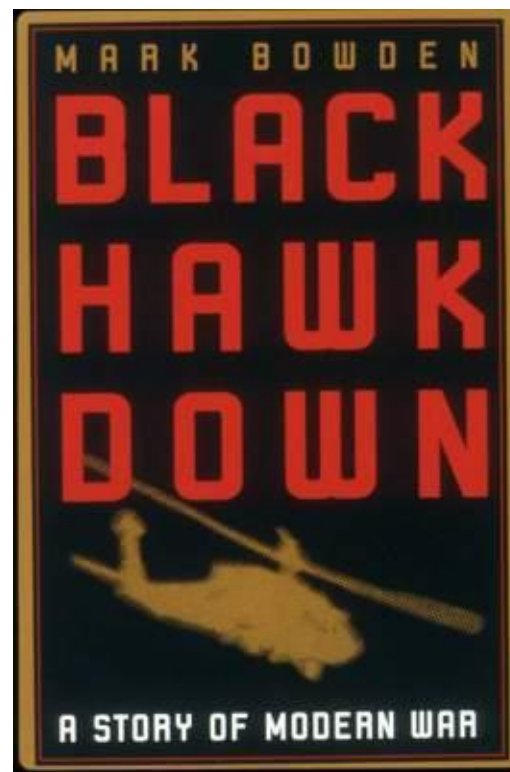


Fluid Resuscitation in TCCC: 1996

- **IVs and fluid resuscitation delayed until Tactical Field Care**
- **No IV fluids for casualties not in shock**
- **No IV fluids for casualties in shock resulting from uncontrolled hemorrhage**
- **1000 cc of Hespan initially for casualties in shock as a result of hemorrhage that is now controlled**
- **Limit Hespan to 1500 cc or less**



Mogadishu: The Tactical Medicine Lessons Learned



**Special Operations Medical Association
8 December 1999**



Loss of Consciousness in Uncontrolled Hemorrhage

- Clear consensus among the panel members that a casualty with mental status changes due to shock must be fluid resuscitated
- Panel members stressed the importance of not trying to aggressively administer IV fluids with the goal of achieving "normal" blood pressure in casualties with penetrating injuries of the chest or abdomen.





Triservice DoD Fluid Resuscitation Conferences

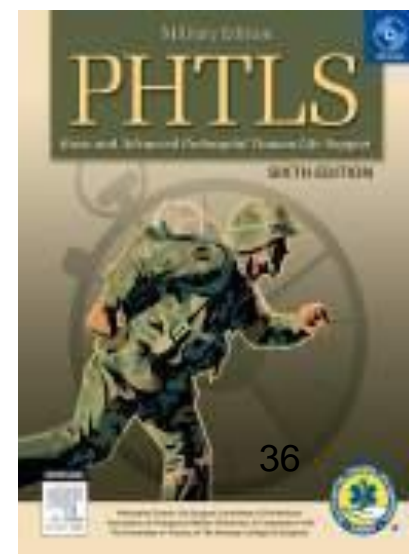
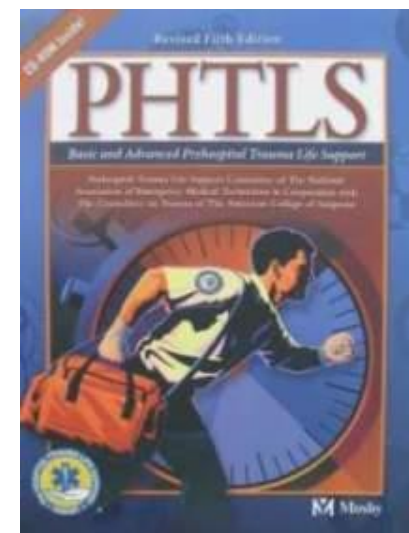
- Held in 2001- 2002
- Co-chairs: COL John Holcomb and Dr. Howard Champion





TCCC Change - 2003

- Recommended change adopted by Committee on TCCC
- Published in Revised 5th Edition of PHTLS Manual
- Maintained in current Sixth Edition of PHTLS Manual
- PHTLS recommendations are endorsed by ACS Committee on Trauma and NAEMT
- Widely used in U.S. military
- Re-affirmed by Jan 2010 ISR Fluid Resuscitation conference





Fluid Resuscitation

Tactical Field Care - Current

6. Fluid resuscitation

Assess for hemorrhagic shock; altered mental status (in the absence of head injury) and weak or absent peripheral pulses are the best field indicators of shock.

a. If not in shock:

- No IV fluids necessary**
- PO fluids permissible if casualty is conscious and can swallow**



Fluid Resuscitation

Tactical Field Care - Current

6. Fluid resuscitation (cont)

b. If in shock:

- Hextend, 500-mL IV bolus
- Repeat once after 30 minutes if still in shock.
- No more than 1000 mL of Hextend

c. Continued efforts to resuscitate must be weighed against logistical and tactical considerations and the risk of incurring further casualties.

d. If a casualty with TBI is unconscious and has no peripheral pulse, resuscitate to restore the radial pulse.



Fluid Resuscitation

Tactical Field Care - Current

5. Fluid resuscitation

Reassess for hemorrhagic shock (altered mental status in the absence of brain injury and/or change in pulse character).

a. If not in shock:

- No IV fluids necessary.
- PO fluids permissible if conscious and can swallow.

b. If in shock:

- Hextend 500-mL IV bolus.
- Repeat once after 30 minutes if still in shock.
- No more than 1000 mL of Hextend.



Fluid Resuscitation

Tactical Field Care - Current

5. Fluid resuscitation (cont)

- c. Continue resuscitation with packed red blood cells (PRBCs), Hextend, or Lactated Ringer's solution (LR) as indicated.
- d. If a casualty with TBI is unconscious and has a weak or absent peripheral pulse, resuscitate as necessary to maintain a systolic blood pressure of at least 90 mmHg.



Proposed Change: Fluid Resuscitation in TCCC



CAPT Jeff Timby



Fluid Resuscitation Guideline Revision

Perceived Deficiencies:

- Does not call for use of blood pressure measurements where these may be available during TACEVAC
- Does not reflect current theater trauma practice of giving PRBCs and plasma in a 1:1 ratio
- Calls for Hextend to be used initially instead of plasma and PRBCs when they are available
- Decision for fluid resuscitation in casualties with TBI should be based on pulse character or hypotension, not mental status.



Fluid Resuscitation Guideline Revision

6. Fluid resuscitation

Assess for hemorrhagic shock; altered mental status (in the absence of head injury) and weak or absent peripheral pulses are the best field indicators of shock.

a. If not in shock:

- No IV fluids necessary
- PO fluids permissible if casualty is conscious

b. If in shock:

- Hextend, 500-mL IV bolus
- Repeat once after 30 minutes if still in shock.
- No more than 1000 mL of Hextend



Fluid Resuscitation Guideline Revision

6. Fluid resuscitation (cont)

- c. Continued efforts to resuscitate must be weighed against logistical and tactical considerations and the risk of incurring further casualties.
- d. If a casualty with **an altered mental status due to suspected TBI** has a weak or absent peripheral pulse, resuscitate as necessary to maintain a palpable radial pulse.



Fluid Resuscitation Guideline Revision

5. Reassess for hemorrhagic shock (altered mental status in the absence of brain injury and/or change in pulse character). **If BP monitoring is available, maintain target systolic BP 80-90 mmHg.**
 - a. If not in shock:
 - No IV fluids necessary.
 - PO fluids permissible if conscious and can swallow.
 - b. **If in shock and blood products are not available:**
 - Hextend 500-mL IV bolus
 - Repeat after 30 minutes if still in shock.
 - **Continue resuscitation with Hextend or crystalloid solution as needed to maintain target BP or clinical improvement.**



Fluid Resuscitation Guideline Revision

- c. If in shock and blood products are available under an approved command or theater protocol:
 - Resuscitate with 2 units of plasma followed by packed red blood cells (PRBCs) in a 1:1 ratio. If blood component therapy is not available, transfuse fresh whole blood. Continue resuscitation as needed to maintain target BP or clinical improvement.
- d. If a casualty with an altered mental status due to suspected TBI has a weak or absent peripheral pulse, resuscitate as necessary to maintain a palpable radial pulse. If BP monitoring is available, maintain target systolic BP of at least 90 mmHg.



Blood Products Governing Directives

- **ASD Health Affairs letter dtd 19 March 2010**
 - **Non FDA-compliant blood products**
 - **Emergency use only**
 - **Prescreened donor pools**
 - **Combatant command protocols**
- **JTTS CPG – Damage Control Resuscitation**
- **JTTS CPG – Fresh Whole Blood Transfusion**



JTTS Trauma Telecon

5 Aug 2010 Prehospital Blood

- **24 y/o injured by IED**
- **Bilateral traumatic amputations – extensive abdominal and perineal injuries**
- **Tourniquets both legs**
- **Sternal intraosseous device placed**
- **Transported by British MERT team to Bastion**
- **Given 2 units PRBCs, 2 units plasma in flight**
- **Arrived in ED normotensive**



Selected Literature on Blood Products in Trauma

- **Greer SE: Curr Opin Anes 2010**
- **Makley AT: J Trauma 2010**
- **Spinella PC: J Trauma, 2009**
- **Duchesne JC: J Trauma, 2009**
- **Hoyt DB: JACS, 2009**
- **Holcomb JB: J Trauma, 2008**
- **Weinberg JA: J Trauma, 2008**
- **Borgman MA: J Trauma, 2007**

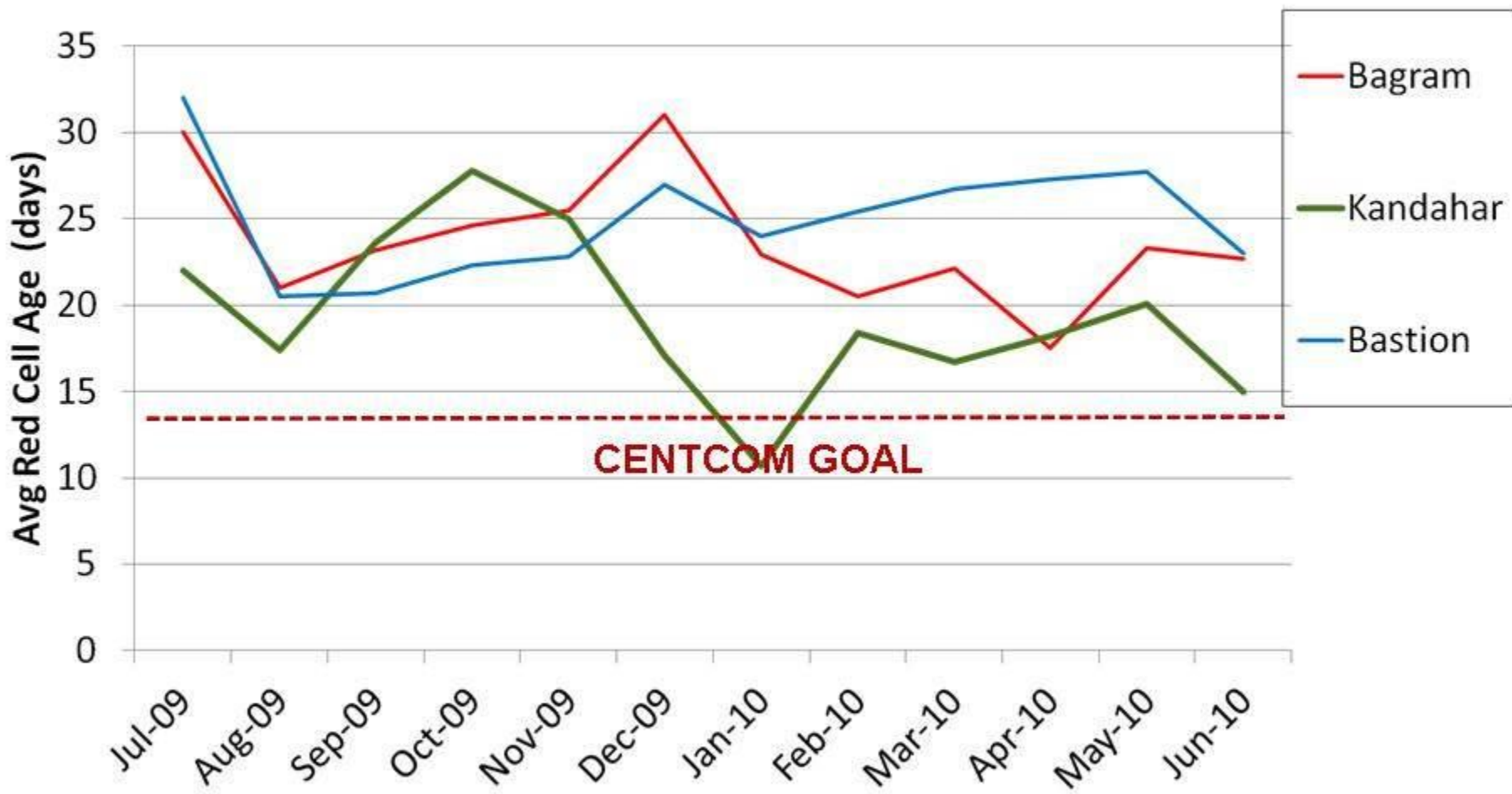


Questions?





Red Cell Age in Massive Transfusion





**United States Army Institute of Surgical
Research, Fort Sam Houston, TX 78234-6315**

**Preventing Hypothermia; An Evaluation
Comparing Current Devices Used By The
US Army, Utilizing An *In Vitro* Warmed
Saline Model**

**Paul B. Allen, Michael A. Dubick, Steven W. Salyer, John B.
Holcomb, Lorne H. Blackbourne**

The opinions or assertions expressed herein are the private views of the authors and are not to be construed as official or as reflecting the views of the US Department of the Army or the US Department of Defence.



Methods

- This was a controlled evaluation, designed to test current methods used to prevent hypothermia.
- A fluid model was constructed with 5000 cc bags of dialysate solution. This model was intended to simulate the severely traumatized patient who cannot thermoregulate.
- Bags were configured to the size and weight of an adult human torso (approx 60% of 70 Kg, or 48.6KG), and heated to 37° C).
- A temperature probe was placed inside a central bag and on the bag surface below the warmer for core and surface temperature measurements, respectively.



Active Warming Devices



Original HPMK™



New HPMK™



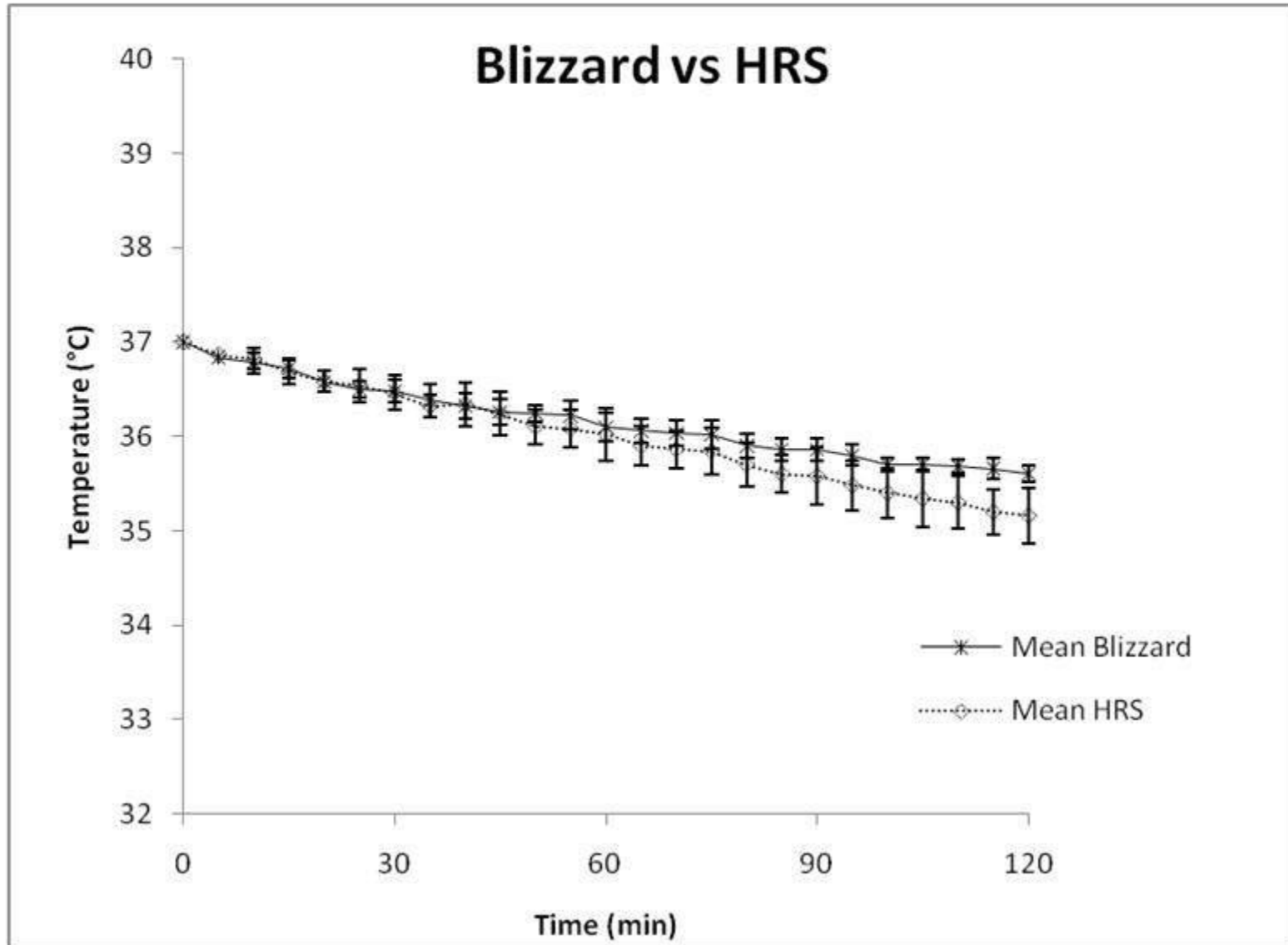
Ready Heat



Bair Hugger



Blizzard vs. HRS





New HPMK

- For up to 1 hour, the rate of temperature loss between the original and the new outer blanket appeared identical.
- After 1 hour, there was some divergence suggesting that the Blizzard™ blanket may perform slightly better; but results were not statistically significant.
- There were no significant differences in the rate of loss of core temperature between the Ready Heat blankets in the original and new HPMK™ evaluated. However, the new Ready Heat™ did not perform exactly like the original.



Passive Group

- Wool blanket provided no significant heat loss prevention as compared to the control.
- The best passive methods of heat loss prevention were the Hot Pocket and Blizzard™ blanket. These methods achieved the same performance as 2/3 active heating methods at 60 minutes and 120 minutes (P 0.391/ 0.9845).



TCCC Update





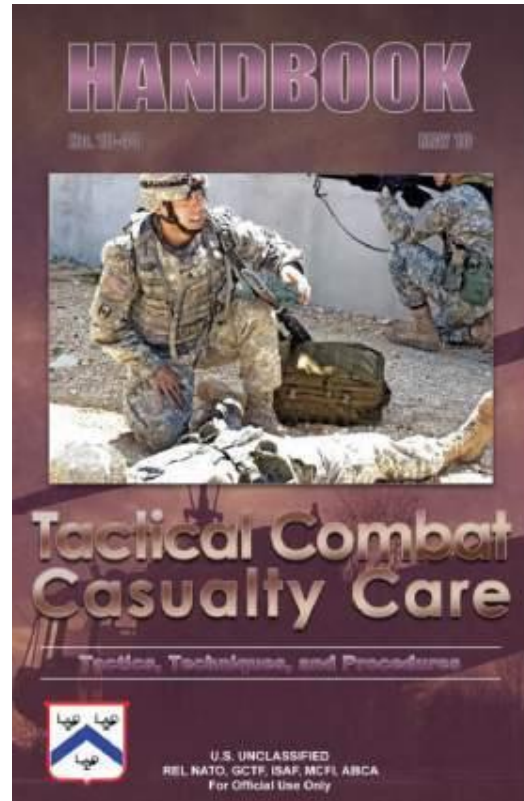
New TCCC Curriculum



- **TCCC Curriculum revision complete**
- **Now on MHS and PHTLS websites**



CALL TCCC Handbook



May 2010



JTTS Brief to DHB

14 July 2010

- **Col George Costanzo – Incoming Director**
- **Recommended permanent funding for JTTS**
- **Recommended location – ISR**
- **Site visit to ISR and DHB Core Board vote pending**





OTFC

REVIEW ARTICLE

Drugs 2010; 70 (1): 57-72
0012-6667/10/0001-0057/\$55.55/0

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Formulations of Fentanyl for the Management of Pain

Sina Grape,¹ Stephan A. Schug,^{1,2,3} Stefan Lauer³ and Barbara S. Schug⁴

1 Department of Anaesthesia and Pain Medicine, Royal Perth Hospital, Perth, Western Australia, Australia

2 Pharmacology and Anaesthesiology Unit, University of Western Australia, Perth, Western Australia, Australia

3 Department of Anaesthesiology and Intensive Care Medicine, University of Muenster, Muenster, Germany

4 SocraTec R&D GmbH, Oberursel, Germany

New review article on Fentanyl



OTFC

In addition, OTFC has been used for the treatment of acute and non-cancer pain. When administered for post-hysterectomy pain, 200–800 μg of OTFC produced effective analgesia within 5 minutes.^[50] OTFC has also been used for migraine headache,^[59] pain from sickle cell disease^[60] and as analgesia for outpatient wound care and burn wound care in children.^[61,62] While no large-scale data are available in settings other than breakthrough pain in patients with chronic pain, there seems to be little value in administering OTFC over intravenous or oral analgesics for acute pain; OTFC is specifically contraindicated in opioid-naïve patients, including use to manage acute and postoperative pain.

What is missing from this paragraph?



OTFC

- **Multiple reports indicate OTFC well-suited for battlefield analgesia**
- **Focused literature review ongoing**
- **No published case series of adverse events in otherwise healthy, military-age trauma patients identified to date**
- **Contact with FDA**
- **Review of adverse event reports pending**



TXA – CRASH 2 Study

Lancet Online Article 2010

Effects of tranexamic acid on death, vascular occlusive events, and blood transfusion in trauma patients with significant haemorrhage (CRASH-2): a randomised, placebo-controlled trial



*CRASH-2 trial collaborators**

- **Prospective, randomized controlled trial**
- **Over 20,000 patients**
- **TXA significantly reduced all causes mortality from 16.0% to 14.5%**
- **TXA significantly reduced death from bleeding from 5.7% to 4.9%**



TXA – CRASH 2 Study

Lancet Online Article 2010

USAISR Information Paper:

- **Blocks plasmin activation and clot lysis**
- **Loading dose 1 gram over 10 minutes IV**
- **FDA-approved for dental procedures in hemophiliacs**
- **Noted to increase cerebral ischemia in SAH**
- **Randomized, double-blinded, placebo-controlled trial – highest level of clinical evidence**
- **No subgroup analysis for patients requiring massive transfusion or those with TBI**
- **Cost: \$80 for 2-dose regimen used in CRASH 2**
- **Used for the past year by UK forces**
- **Might have saved 23 of 1500 preventable deaths in OIF/OEF**



TXA - CRASH 2 Study Lancet Online Article 2010

Holcomb comments:

- **In a drug that was supposed to decrease bleeding:**
- **50% of the patients did not get any RBCs**
- **The rate of transfusion was the same between groups = 6 units**
- **Only 48% had any surgery**
- **The difference in mortality due to bleeding was 0.8%**
- **Hours 1-3 after injury is where all the benefit was**
- **How do you determine if these was a significant type 1 error?**



TXA - Crash 2 Study

Lancet Online Article 2010

Additional comments – Bryan Cotton:

- **It would be interesting to study this drug in patients who actually had "traumatic hemorrhage."**
- **Not surprised to see that such a drug would not have any effect on the number of units transfused in such a general population.**
- **Sub-group analysis on patients arriving in shock?**
- **Here is a trauma paper without any mention that I can find of ISS, base deficit, lactate.**
- **MOST IMPORTANT: we're talking about a 0.7% absolute reduction in "death due bleeding"**
- **Zero POINT seven**
- **This translates into number needed to treat of 132**



TXA- CRASH 2 Study Lancet Online Article 2010

Additional comments:

- **TXA administered 2.8-2.9 hours after injury**
- **Given to those “at risk” of hemorrhage**
- **68% had SBP > 90 mmHg**
- **What should protocol be in at MTFs?**
- **Prehospital protocol?**
- **JTTS Directors conference 23 July 10 – no decision to add TXA to theater formulary**



JTTS Weekly Trauma Teleconference Cases





Tourniquet- Related Palsy

22 April 2010

- **Casualty arrived with TQ – type?**
- **Found to have severe palsies of radial, median, and ulnar nerve of right forearm**
- **No major UE vascular injury per WRAMC**
- **TQ time approx 45 min per patient on F/U**
- **Palsy still present on discharge from WRAMC**
- **Much improved on F/U 21 May 2010 – minimal weakness – normal NCS – good prognosis**



Helmet Penetration

10 June 2010

- 21 y/o
- Right-sided GSW thru helmet
- GCS 15 on arrival
- Left-sided paresis
- Survived





In-Flight Tourniquet

24 June 2010

- **AF Pave Hawk pilot on EVAV mission to pick up wounded UK soldier**
- **GSW both legs**
- **Severe bleeding R leg**
- **PJ crawled up into cockpit and applied tourniquet**
- **Bleeding controlled - pilot completed mission**



Suspected AGE

15 July 2010

- **Blast exposure**
- **Polytrauma**
- **Failed cric**
- **Bilateral pneumothoraces**
- **Sub-q emphysema**
- **Pneumomediastinum**
- **Focal ischemic pattern on brain MRI**
- **8 days post-injury – HBO or not?**





Patched Open Globe

22 July 2010

- **Shrapnel OD from IED**
- **Had fox shield**
- **Reported as both pressure patched and as having a gauze pad placed under the fox shield without pressure**
- **Extruded uveal tissue noted at time of operative repair of globe**
- **COL Mazzoli : No gauze under fox shield - gauze can adhere to uveal tissue and cause further extrusion when removed even if no pressure**



From the JTTS Deployed Director - 26 July 2010

- 1. Crics. As you know from attending the VTCs, we have seen several failed Crics and some of them may have contributed to bad outcomes. I think crics are difficult to train for because the animal models are too easy and cadavers/manikins don't bleed. It's hard enough for a surgical resident to get a cric in under emergent conditions much less an intermediate medic who may do 1 in their entire career. Both the SOP for airway and the CPG, state that the King Airway should be considered. Based on my reading the chart, it doesn't seem to me that this option is being utilized to its maximum potential and the medics are going straight to crics. I think we should emphasize the King Airway as a salvage technique and if that fails go to cric. What do you think?
- 2. IOs. We have had IO break off in the sternum of 3 patients requiring surgical removal. They were all EZ IOs placed by MERT. I think that this is a patient safety issue and this model of IO should not be placed in the sternum. What do you think?



JTTS Trauma Telecon Prehospital Crics

- **17 June – 1 delayed; 1 in soft tissue**
- **8 July – failed cric**
- **15 July – failed crics – 2 cases**





JTTS Trauma Telecons Combat Gauze

- **17 June – CG used in sacral wound – in MTF – good effect**
- **24 June – CG used in chest wound – in MTF – good effect**





JTTS Trauma Telecons

Spinal Fx with Neuro Deficits

- **1 July – Helo crash – jumped facets T11/T12 – unable to move either LE – arrived on spine board – casualty reported that motor deficit occurred at time of initial injury**





Questions?



What is this Device?



Service IFAKs

TCCC Item	USA IFAK	USMC IFAK	USAF IFAK	SOF IFAK
Tourniquet		TK-4		
CAT	Green	Red	Green	Green
SOFT-T		Red		
Nasopharyngeal airway	Green	Red	Green	Green
Combat Gauze	Green	Green	Green	Green
Elastic Bandage Pressure	Green	Red	Green	Red
14ga 3.25" Needle	Red	Red	Red	Red
Chest Seal Dressing	Red	Red	Red	Red
Rigid Eye Shield	Red	Red	Red	Red
Combat Pill Pack				
Tylenol ER	Red	Red	Red	Green
Moxifloxacin 400mg	Red	Red	Red	Green
Mobic 15mg	Red	Red	Red	Green
TCCC Card	Green	Red	Red	Green



Combat Medical Sets

TCCC Item	USA 68W	USMC CAP	USAF PJ	SOF ATP
Tourniquet				
CAT				
SOFT-T				
Combat Gauze				
Elastic Bandage				
Nasopharyngeal Airway				
Surgical Airway Set				
14ga. 3.25" Needle				
Chest Seal				
Hextend				
IV Supplies				
IV Tubing				
IV Catheter				
Saline Lock				
Tape				
Tegaderm Dressing				
Intraosseous Device				
Hypothermia Prev Kit				
Blizzard Blanket				
Ready Heat				
Hypothermia Cap				
Rigid Eye Shield				
Pulse Oximeter				
TCCC Card				

Medications

TCCC Item	USA 68W	USMC CAP	USAF PJ	SOF ATP
Combat Pill Pack				
Tylenol ER				
Mobic 15mg				
Moxifloxacin 400mg				
Analgesics				
OTFC 800ug				
Morphine 5mg IV/IO	Morphine 10mg IM			
Naloxone				
Promethazine 25mg IV				
IV/IM Antibiotics				
Ertapenem 1gm				
Cefotetan 2gm				
Fluids for mixing meds				



14 September 2009

Military considers revised medical training for troops

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SAVING LIVES

Improved trauma care techniques could have prevented up to 20% of combat deaths in Iraq and Afghanistan.

Total number of combat deaths: 4,800

Estimated preventable deaths: Up to 808

Source: USA TODAY research

By Gregg Zoroya, USA TODAY

WASHINGTON — Troops trained in advanced trauma care could prevent up to 20% of combat deaths in Iraq and Afghanistan, the military's top medical board says.

The Defense Health Board said in a recommendation to the Pentagon last month that enhanced Tactical Combat Casualty Care (TCCC) skills developed by military trauma specialists already have saved an estimated 1,000 lives in both wars.

For example, preventable combat deaths — primarily cases where troops bleed to death — have been eliminated in an Army Special Forces unit and the 75th Ranger Regiment, both trained in these skills. Among other techniques, the training emphasizes aggressive control of blood loss with tourniquets.

More than 4,000 U.S. troops have died from combat wounds suffered in Iraq and Afghanistan.

The Army's goal is to replace its first aid training with the TCCC curriculum by Jan. 1, says Col. Karen O'Brien, command surgeon for the Army Training and Doctrine Command. She says she decided to recommend changing the training after reviewing the same statistics presented to the Defense Health Board.

Most preventable deaths involved troops who bled to death, according to military trauma surgeons who studied autopsy and medical records of servicemembers who died from their wounds.

USA Today Feature Article

14 Sept 2009

"We looked at all the things that were the most common preventable causes of death ... and what we could do to prevent that and the most striking example was tourniquet use," says Dr. Frank Butler, a retired Navy captain and former SEAL, who led development of the enhanced casualty care training techniques.

Controlling blood loss is the key, says Army Lt. Col. Russ Kotwal, regimental surgeon for the 75th Ranger Regiment. Soldiers of that elite unit have been skilled in these techniques since 2000. The Regiment has since suffered 550 to 600 casualties, including only 37 deaths, Kotwal says.

The Defense Health Board, an independent advisory panel to the secretary of Defense, unanimously recommended on Aug. 6 that "all deploying servicemembers who may become combatants ... (and) all deploying medical department personnel" be trained in TCCC.

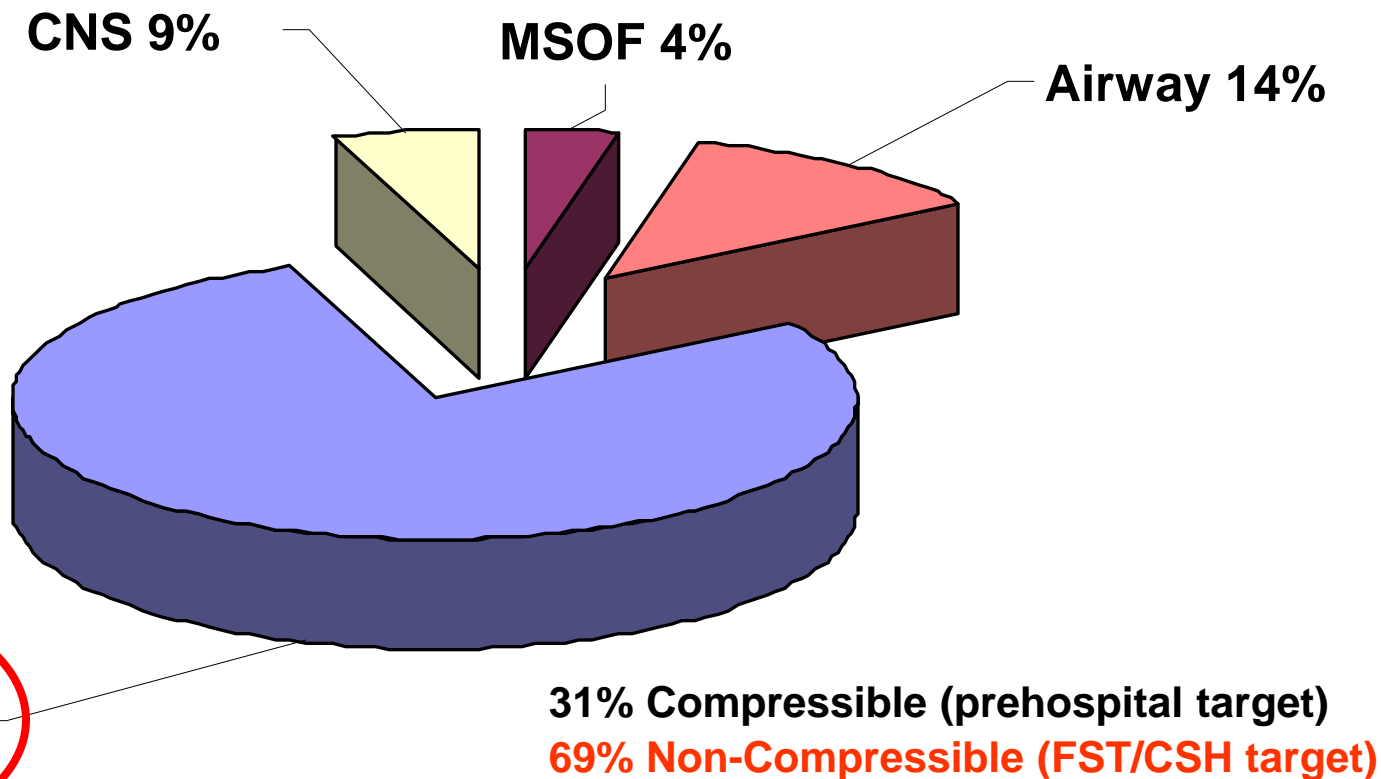
Pentagon leaders are studying the recommendations, says Dr. Michael Kilpatrick, a spokesman for the military's medical health service.

Improved training includes teaching troops how to better use tourniquets, dressings and bandages; and treating shock and chest wounds. The TCCC curriculum also teaches troops how to provide care during a firefight to limit the severity of injuries.

Because of advances in battlefield care, about one in 10 wounded troops die in Iraq and Afghanistan, Pentagon data show, compared with one in five in World War II and 16% in Vietnam.



Potentially Survivable Deaths (232)



From evaluation of 982 casualties, and casualties could have more than 1 cause of death. (Kelly J., J Trauma 64:S21, 2008)



Crystalloids vs Colloids

- **For fluid resuscitation in traumatic hemorrhagic shock states that "there is almost universal agreement that colloid containing fluids act more efficiently than crystalloid fluids to restore hemodynamic stability."**

Falk et al. Critical Care Clinics 1992

- **"When rapid expansion of the intravascular volume is desired, colloids are the clear choice".**

Marino; The ICU Book



Crystalloids vs Colloids

- **Crystalloids alone are insufficient for resuscitation of patients with blood loss of greater than 30% of their blood volume (1500 ccs).**
- **Blood loss of 30 % is required for a drop in blood pressure to be seen (Class III hemorrhage)**

ATLS Manual 1993



Far-Forward Use of Fresh Whole Blood



CPT Chris Cordova